

**DUAL AND HYBRID EGR SYSTEMS FOR USE
WITH TURBOCHARGED ENGINES**

ABSTRACT OF THE DISCLOSURE

- 5 EGR systems for an internal combustion engine configured to operate using multiple-staged turbochargers, or a pair of single stage turbochargers, to provide exhaust gas recirculation to meet emissions requirements while not affecting engine performance. One or two EGR loops operating at low, intermediate, or high pressures may be employed. EGR exhaust gases may be taken directly from the exhaust manifold, or after the exhaust stream has passed through a turbocharger turbine.
- 10 EGR exhaust gases may be injected at an intermediate pressure between stages of a multiple stage turbocharger, or alternatively between a low pressure turbocharger compressor and high pressure turbocharger compressor, before being boosted to a pressure high enough to ensure the desired mass flow to the engine and delivered to the intake manifold. Intake air may be pressurized prior to mixing with the EGR exhaust gases.